Japanese Kokai Patent Application No. Hei 9[1997]-256649
[Paragraphs 7-22 only, as requested]

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[0007]

Means to solve the problems

The present invention was proposed to solve the aforementioned problems and provides a disassembling method for reinforced concrete structures characterized by the fact that in a method for disassembling a reinforced concrete structure, upon connecting an anode to the reinforcing bars, connecting a cathode to the concrete surface, and conducting direct current, the aforementioned cathode is composed by covering a high water-absorption cathode plate mixed with a prooxidant in the disassembling area of the concrete surface, and a disassembling method for reinforced concrete structure in which the aforementioned cathode plate is composed by applying a conductive putty formed by mixing and kneading bentonite and magnesium chloride as the aforementioned prooxidant in water to a wire gauze.

[0008]

Here, the reason for the aforementioned cathode plate being a high absorption type is that the higher the water absorption, the more the prooxidant tends to be electrolyzed; the more the interfacial resistance between the cathode plate and the concrete is minimized; and the more the conductivity is enhanced. Therefore, the lower limit for the high water absorption is the extent at which the mixed prooxidant can be electrolyzed sufficiently.

[0009]

Also, bentonite has a high water holding property and sufficiently satisfies the condition of high water absorption.

[0010]

Embodiment of the invention

Below, an embodiment of the present invention will be described in detail according to Figures 1 and 2. In the figures, (1) is the concrete in a reinforced concrete structure, and reinforcing bars (2) as the reinforcing steel are embedded vertically and horizontally within this concrete (1). When disassembling partial area (R) of this reinforced concrete structure, several points at the periphery of said partial area (R) are chipped (chipped points (3), (3) ...) first of all with a hand breaker or the like, and anode terminal (5) of DC power supply unit (4) is connected to reinforcing bars (2a), (2a) ... exposed from these chipped points (3), (3) ... Here, the extreme end of this anode terminal (5) is a magnet; hence, connection can be made easily.

[0011]

Then, cathode plate (6) is installed on the surface of said partial area (R) to cover this partial area (R). This cathode plate (6) was formed by applying conductive putty (8) to a wire gauze (7), and as the installation method thereof, it is possible to affix wire gauze (7) on the surface of aforementioned partial area (R) then apply conductive putty (8) from above or apply conductive putty (8) to wire gauze (7) beforehand and then affix this on the surface of the aforementioned partial area (R).

[0012]

Also, the aforementioned conductive putty (8) was formed into a putty by mixing and kneading bentonite and magnesium chloride at a weight ratio of 1:1 and water ratio of 30-40%. Incidentally, it is possible to use a high water absorption nonwoven fabric that was impregnated with a prooxidant such as magnesium chloride or the like as the aforementioned cathode plate.

[0013]

Then, cathode terminal (9) of the aforementioned DC power supply unit (4) is connected to one end of wire gauze (7) of aforementioned cathode plate (6) and DC electricity of low voltage · low current is conducted between the aforementioned reinforcing bars (2) and the concrete (1) surface. Conduction time is about a few hours to one day and as the amount of conduction, a few Wh/m^2 to a few tens Wh/m^2 is sufficient. Then, the following phenomena appear in the aforementioned partial area (R) according to the conduction.

[0014]

θ The magnesium chloride in conductive putty (8) of cathode plate (6) is electrolyzed and is converted to chlorine ions and magnesium ions. At this time, the bentonite in the aforementioned conductive putty (8) has superior water holding property; hence, the interfacial resistance between cathode plate (6) and the concrete (1) minimizes, and the conductivity is enhanced.

[0015]

ω The calcium ions in concrete (1) elute, move toward cathode plate (6), and the strength of concrete (1) decreases.

ε The iron in reinforcing bars (2) is electrolyzed and elutes. In accordance, the cross-sectional area of the reinforcing bars decreases, and the adhesive strength to the concrete (1) decreases.

[0016]

ρ The water in concrete (1) and the iron ions that eluted according to ε react and a corrosion product is formed at the interface of steel bars (2) and concrete (1) and expands.

τ The chlorine ions formed according to θ diffuse in the concrete (1), react with sodium hydroxide in said concrete (1) and change the hard body of concrete (1) into a porous body.

[0017]

ψ Also, the chlorine ions diffuse in concrete (1) easily compared to sulfate ions and the like and infiltrate more deeply. Then, when the chlorine ions reach the reinforcing bars (2), the nonconductive coat on the surface of said reinforcing bars (2) is destroyed. As a consequence, corrosion in ρ is promoted and cracks are created in the concrete (1).

[0018]

υ Magnesium ions formed according to ω infiltrate into the hard body of concrete (1) that was made porous according to τ and make the concrete (1) water-soluble. Namely, infiltrated magenisum ions react with calcium silicate hydrate and form magnesium silicate hydrate which lacks bonding strength. As a consequence, the compressive strength of the concrete (1) decreases. (According to testing, the compressive strength decreased to 50-60% of the initial strength.) Then, by peeling off cathode plate (6), partial area (R) of the reinforced concrete structure can be disassembled very easily.

[0019]

Incidentally, the present invention can be applied with various modifications as long as it does not deviate from the essence of the present invention, and naturally, the present invention includes the modifications.

[0020]

Effect of the inventon

As was described above, the present invention mixed a prooxidant in the cathode plate; hence, in addition to the work being simplified, only the area installed with the cathode plate can be degraded, and there is no concern over degrading the areas that are not to be disassembled. Therefore, the present invention is suited for partial disassembly of a reinforced concrete structure, and the work efficiency improves greatly when applied to repairing · remodeling of roof slabs, sidewalls, or the like of a building or to disassembling of a shielded explosion path [unconfirmed translation] or arrival hole of an underground shaft.

[0021]

Also, if the cathode plate is formed having a high water absorption by mixing and kneading bentonite, which has a superior water holding property, and magnesium chloride, which becomes an electrolyte in water, the interfacial resistance between the cathode plate and the concrete is minimized, and the conductivity can be enhanced.

[0022]

Furthermore, by using magnesium chloride as the prooxidant, the magnesium ions infiltrate into the hard concrete body that was made porous and makes the concrete water-soluble according to the combination of the function the chlorine ions of high diffusibility have in making the hard concrete body porous and the function of destroying the nonconductive coat on the reinforcing bar surface; hence, the compressive strength of the concrete can be decreased as much as possible even when sodium chloride or calcium chloride is used.

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